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REMARKS

This submission is responsive to the Final Office Action dated July 14, 2006. Applicant has not amended the claims. Claims 1-8, 10-18 and 20-25 remain pending.

Claim Rejection Under 35 U.S.C. § 103

In the Final Office Action, the Examiner rejected claims 1-8, 10-18 and 20-25 under 35 U.S.C. § 103(a) as being unpatentable over USPN 6,996,631 to Aiken Jr. et al. (Aiken) in view of USPN 6,128,657 to Okanoya et al. (Okanoya). Applicant respectfully traverses the rejection. The applied references fail to disclose or suggest the inventions defined by Applicant's claims, and provide no teaching that would have suggested the desirability of modification to arrive at the claimed invention.

Prior to addressing deficiencies of Aiken and Okanoya with respect to the requirements of Applicant's claims on a claim-by-claim basis, Applicant generally addresses one obvious deficiency relevant to some of the claims, and some deficiencies relevant to all of the claims.

First, independent claims 1, 18 and 22 require that an intermediate computer networking device between a plurality of clients and single physical server comprises a plurality of agents, each of the agents assigned to a different one of a plurality of client TCP connections with the intermediate device. As acknowledged by the Examiner, Aiken does not disclose or suggest this requirement of independent claims 1, 18 and 22. The Examiner relies on Okanoya as teaching this requirement.

However, contrary to this requirement, Okanoya teaches a plurality of state management means 2b, 3b and 4b, each of the agents located within one of a plurality of servers 2, 3 and 4, rather than within the intermediate central station, to send the status of the servers to a central station that performs load balancing amongst the servers.[1] Thus, Okanoya fails to even suggest agents within an intermediate device.

Further, Okanoya does not even suggest agent means that are each associated with a different one of a plurality of client TCP connections. In fact, there is no discussion of state management means 2b, 3b, and 4b in Okanoya with reference to TCP connections, much less that each of state management means 2b, 3b and 4b in any way correspond to respective client

[1] Okanoya, FIG. 1, col. 5, ll. 15-35.

TCP connections. Thus, even when combined, Aiken and Okanoya still clearly fail to teach or suggest this requirement of independent claims 1, 18 and 22.

Moreover, Applicant's invention differs from the systems of Aiken and Okanoya in fundamental ways, addresses completely different problems, and provides a completely different solution. Prior efforts at reducing the burden associated with handling client requests on any given server have focused on distributing the requests amongst a plurality of server devices, e.g., a server farm. Like many of the references cited in the prior Office Action's, Okanoya is an example of such a solution. Okanoya employs a communication controller to distribute traffic among a plurality of separate physical servers.[2] Specifically, Okanoya describes a load sharing system that operates at the third layer of the OSI network model, i.e., the Network layer, to distribute of client requests. See, e.g., Okanoya at col. 12, ll. 25-30 describing the use of network layer functions of the OSI model to distribute requests to clients.

Although different from Okanoya in some respects, Aiken is also an example of this type of solution, i.e., a solution that operates at the network layer to distribute packet streams. Aiken discloses a Sysplex 10 that includes a plurality of data processing systems 20, 24, 28, 32 and 36.[3] Although the plurality of data processing systems of the Sysplex may be embodied in a single device, each of the data processing systems includes a single, respective TCP/IP stack 22, 26, 30, 34 and 38.[4] Aiken teaches that one of the stacks may act as a "routing" stack to distribute client traffic among the other stacks.[5] Aiken makes clear that routing table entry is created for each stack.[6] Thus, Aiken is an example of load balancing at the third layer of the OSI network model, i.e., the Network layer, which is responsible for performing routing functions.[7] These typical prior art solutions rely on routing functions so as to distribute traffic across physical servers.

In contrast, Applicant's claims require an intermediate computer networking device that has a plurality of server TCP connections to a plurality of respective <u>sockets</u> on a single physical server separate from the intermediate device. Claim 17 specifically requires determining an

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[2] Okanoya, Abstract.
[3] Aiken, Fig. 4, col. 8, ll. 49-52.
[4] Aiken, Fig. 4, col. 8, ll. 52-55 and 62-65.
[5] Aiken, col. 9, ln. 58 – col. 10, ln. 15.
[6] Id at Abstract
[7] See, e.g., http://en.wikipedia.org/wiki/OSI_model (stating the well-known principle that the Network layer performs network routing functions).

optimal server **socket**. Other independent claims require that the intermediate device monitors response parameters specific to individual ones of the plurality of server TCP connections (i.e., sockets) to the same server, and selects one of the server TCP connections for transmission of client requests to the single server using the respective socket based on the monitoring.

Thus, the literal language of the claims make clear that embodiments of the invention are directed to an intermediate device that multiplexes HTTP communications at the across **sockets** to the same server. Applicants emphasize that this is much more than a subtle difference from the prior art approaches cited by the Examiner. For example, it is well known that sockets provide an interface between software applications executing at the application layer of the OSI network stack (i.e., layer 5 and above) and the transport layer (i.e., layer 4).[8] Thus, in terms of the OSI network stack, sockets are upper-level communication mechanisms that are employed by software applications. A single application executing on a client device may, for example, use multiple sockets to communicate data to lower layers of the network stack for transport through a network.

Applicant's independent claims require an intermediate device that multiplexes HTTP communications across **sockets** to the same server based on monitoring of respective TCP connection. Thus, embodiments according to the claims facilitate selective distribution of client requests at a higher level of the network stack than contemplated by Aiken and Okanoya, i.e., at the transport layer / application layer of the OSI model by multiplexing connections/sockets rather than the layer three network level. Neither Aiken nor Okanoya remotely suggests selective distribution of traffic among a plurality of connections/sockets to a single physical server based on monitoring of the plurality of connections/sockets. Instead, Aiken and Okanoya both teach distribution of client requests to different devices or stacks, i.e., at the network layer, by use of routing functions. As a result, Aiken in view of Okanoya is unable to address the problems addressed by Applicant's claimed intermediate device. Applicants, for example, recognize that although the sockets provide access to the same server, different sockets may provide different performance based on the state of the upper-layers of the network stacks on the server. Consequently, Applicant's claimed intermediate device detects and monitors network connects at

[8] See, e.g., http://en.wikipedia.org/wiki/OSI_model, (providing well-known examples that Microsoft Windows's Winsock, and Unix's Berkeley sockets and System V Transport Layer Interface, are interfaces between applications (layers 5 and above) and the transport (layer 4).

the higher layers of the network stack, i.e., **sockets**, and multiplexes across different sockets even though those sockets provide communications to the same server. The routing and load-balancing operations taught by Aiken in view of Okanoya do not suggest monitoring or multiplexing at these layers of the network stack, do not address any of the problems addressed by Applicant's solution and fail to suggest any of solution to these problems. For example, even a system that load-balances across different devices, such as the Aiken system and the Okanoya system, may still experience drastically different performance variations between sockets of the same device. The systems described by Okanoya and Aiken do not even recognize these issues nor do the systems provide any mechanism for addressing these issues.

Moreover, Aiken describes systems fundamentally different from what is required by Applicant's independent claims. As stated above, Applicant's claims require an intermediate computer networking device and a single, separate physical server, as well as a plurality of server TCP connections between the intermediate device and the server. Further, as discussed above, Applicant's claims require monitoring of the TCP connections between the intermediate device and the server device, and selective distribution of client requests on the TCP connections between the intermediate device and the server device based on the monitoring. Aiken does not teach or suggest such a system.

Instead, Aiken teaches that the routing systems 20, 36 and the "target" systems 24, 28, 32 (to which requests are routed) in the Sysplex 10 may be embodied in a <u>single device</u>.[9] Thus, in such embodiments, there is no intermediate routing device and separate physical server device, as required by Applicant's claims.

Aiken also suggests that, in alternative embodiments, each of the routing and target systems may be embodied as a separate device.[10] However, Aiken does not even suggest that a plurality of TCP connections between a single one of the routing system and a single one of the target systems are monitored or that client requests are selectively distributed over sockets corresponding to those connections based on the monitoring. Thus, this embodiment of Aiken also fails to meet the requirements in Applicant's claims of two separate devices coupled by plurality of TCP connections, monitoring of the plurality of TCP connections between the two

[9] Aiken, Fig. 4, col. 8, ll. 52-55.
[10] Aiken, Fig. 4, col. 8, ll. 55-60.

devices, and selective distribution of client requests over the plurality of TCP connections between the two devices.

Claims 1 and 2

Aiken and Okanoya fail to disclose or suggest a number of the requirements of independent claim 1. For example, Aiken and Okanoya fail to disclose or suggest a computer networking device comprising an HTTP multiplexor/demultiplexor that monitors response parameters specific to individual ones of a plurality of server TCP connections from the computer networking device to a single physical server device, as required by independent claim 1. As discussed above, Aiken and Okanoya do not contemplate distribution of client requests at the connection/socket level, and thus do not disclose or suggest an intermediate device that monitors response parameters specific to individual ones of a plurality of server TCP connections from the intermediate device to a single physical server device.

In the Office Action, the Examiner asserted that data processing system 20 and data processing system 24 of a Sysplex 10 depicted in FIG. 4 of Aiken are the HTTP multiplexor/demultiplexor and single physical server required by claim 1, respectively. However, even Aiken does not disclose or suggest a computer networking device separate from the system 24 that comprises the system 20 and has a plurality of TCP connections with system 24, as would be if the Examiner's assertion were applied to the limitations of claim 1.

For the "computer networking device" requirement of claim 1, the Examiner cited a lengthy and very general discussion at col. 7, ln. 50 – col. 8, ln. 50, which merely suggests that the Aiken invention may be embodied in hardware or software. This discussion is unrelated to the specific system depicted in FIG. 4, and does not in any way suggest that the system in FIG. 4 includes a computer networking device with a plurality of TCP connections to data processing system 24. Nor could data processing system 20 itself be the computer networking device. Aiken does not disclose or suggest a plurality of TCP connections between data processing systems 20 and 24. Nothing within Aiken suggests a computer networking device with a plurality of TCP connections to data processing system 24.

Moreover, contrary to the Examiner's position, Aiken does not disclose or suggest that data processing system 20 monitors response parameters specific to individual ones of a plurality

of server TCP connections. For this requirement of claim 1, the Examiner cited col. 10, ll. 1-5, which in relevant part states:

> Because communications to the DVIPA are routed through the routing protocol stack, the routing protocol stack may provide work load balancing by distributing connections to the other protocol stacks on MVS images executing server applications which bind to the DVIPA to balance workload.

Applicant respectfully submits that load balancing does not necessarily involve monitoring, and therefore the mere mention of load balancing does not suggest monitoring response parameters. Accordingly, this portion of Aiken does not even disclose monitoring response parameters. Moreover, as discussed above, Aiken does not suggest a plurality of server TCP connections to system 24, which the Examiner argued is a single physical server. Therefore, Aiken certainly does not disclose or suggest that system 20 monitors response parameters specific to individual ones of a plurality of server TCP connections to a single physical server, as would be required by application of the Examiner's reason to the limitations of claim 1.

Also, the applied references do not disclose or suggest selecting one of a plurality of server TCP connections between the intermediate computer networking device and the single physical server based on the monitoring of the response parameters, as required by claim 1. The portion of Aiken cited by the Examiner (col. 16, ll. 15-30) teaches selection from amongst different "target" systems 24, 28 and 32 in the Sysplex 10, not selection from amongst a plurality of server TCP connections to single physical server. As discussed above, the Examiner's argument was that a single one of the target systems, system 24, is the single physical server required by claim 1. Applying the Examiner's analysis of Aiken to the requirement of selecting one of a plurality of server TCP connections between the intermediate computer networking device and the single physical server would require selection from amongst a plurality of server TCP connections to the single system 24. This is not taught by the portion of Aiken cited by the Examiner, or anywhere else in the applied references.

Again, Aiken only contemplates monitoring and selective distribution amongst the plurality of target systems 24, 28 and 32 in the Sysplex 10, not amongst a plurality of server TCP connections to a single physical server, which is the single system 24 according to the Examiner's analysis.

Additionally, as discussed above, the applied references do not disclose or suggest an intermediate device that includes a plurality of agents, each agent assigned to a different one of a plurality of client TCP connections, as required by independent claim 1.

Also, with respect to claim 2, the applied references fail to disclose or suggest receiving multiplexed HTTP responses from the single physical server over the individual TCP connection and routing those responses to the clients via the plurality of client TCP connections. The Examiner cited FIG. 12 of Aiken as teaching this requirement of claim 2 without any explanation of its relevance. This portion of Aiken is related to changing ownership of virtual IP address amongst communication protocol stacks, and appears to have nothing whatsoever to do with sending responses to clients. Applicant respectfully requests the Examiner clarify or withdraw this rejection in any Advisory or other subsequent action.

Claims 3-5

Similar to requirements of independent claim 1 discussed above, independent claim 3 requires monitoring a plurality of server TCP connections from a computer networking device to a single physical server device to determine a response parameter, and selecting one of the server TCP connections based on the determined response parameter. For the reasons discussed at length above, Aiken and Okanoya fail to disclose or suggest these requirements of independent claim 3.

Further, Applicant notes that, in rejecting claim 3, the Examiner appeared to have erroneously identified the client 46 and routing system 20 as being the intermediate computing device and single physical server required by claim 3, respectively. Applicant respectfully suggests that this may have been the result of a mistake in transcribing the rejection set forth with respect to claim 1 in order to reject claim 3. To the extent this was not a mistake, Applicant notes that Aiken does not remotely suggest a plurality of TCP connections between the client 46 and the routing system 20, much less monitoring or selective distribution over a plurality of TCP connections between the client 46 and the routing system 20. Again, Aiken only teaches monitoring and distribution amongst the plurality of target systems 24, 28 and 32.

Also, the Examiner's rejection of claim 3 includes a discussion with respect to an HTTP multiplexor/demultiplexor that includes a plurality of agents. Applicant respectfully points out

that claim 3 does not include these limitations. This mistake also appears to be the result of transcribing the rejection of independent claim 1 in order to reject independent claim 3.

Claims 6-8 and 10-16

Similar to requirements of independent claim 1 discussed above, independent claim 6 requires monitoring a plurality of server TCP connections from a computer networking device to a single physical server device at the computer networking device to determine response parameters, and selecting one of the server TCP connections based on the determined response parameter. For the reasons discussed at length above, Aiken and Okanoya fail to disclose or suggest these requirements of independent claim 6.

Further, with respect to claim 8, the applied references fail to disclose or suggest persistent client TCP connections from clients to an intermediate computing device or persistent server TCP connections from the intermediate device to the separate physical server device. The Examiner cited FIG. 8 of Aiken as teaching this requirement of claim 8 without any explanation of the relevance of FIG. 8 to the requirements of the claim. This portion of Aiken is related to <u>opening and terminating connections</u> between a routing system and target systems in a Sysplex, and thus appears to be directly contrary to the requirements of Applicant's claims. Applicant respectfully requests the Examiner clarify or withdraw this rejection in any Advisory or other subsequent action.

Additionally, similar to claim 2 discussed above, claims 14-16 respectively recite receiving HTTP responses from a selected server socket, demultiplexing the responses to permit selective routing and transmission to corresponding originating clients, and sending the responses. Again, the applied references fail to disclose or suggest these limitations, and the figure of Aiken cited by the Examiner as teaching these limitations appears to be totally irrelevant to these limitations. Applicant respectfully requests the Examiner clarify or withdraw these rejections in any Advisory or other subsequent action.

Claim 17

Similar to requirements of independent claim 1 discussed above, independent claim 17 requires monitoring a plurality of server TCP connections from a computer networking device to

a single physical server device at the computer networking device to determine a response parameter, **determining an optimal server socket** based on the determined response parameter, and sending received requests as a multiplexed transmission to the optimal server socket via one of the plurality of server TCP connections. Similar to claim 2, independent claim 17 also requires receiving HTTP responses from the single physical server device, demultiplexing the responses to permit selective routing and transmission to corresponding originating clients, and sending the responses. For the reasons discussed above with respect to claims 1 and 2, the applied references fail to disclose or suggest these requirements of independent claim 17. Again, Applicant respectfully requests the Examiner clarify or withdraw these rejections in any Advisory or other subsequent action.

Claims 18, 20 and 21

Similar to requirements of independent claim 1 discussed above, independent claim 18 requires an intermediate device comprising an HTTP multiplexor/demultiplexor configured to monitor response parameters that are specific to individual ones of a plurality of server TCP connections from the intermediate device to the physical server device, wherein the HTTP multiplexor/demultiplexor of the intermediate device includes a plurality of agents, each agent assigned to a different one of the client TCP connections, and wherein one of the agents selects one of the plurality of server TCP connections from the intermediate device to the physical server device based on the monitoring. For the reasons discussed above with respect to claim 1, the applied references fail to disclose or suggest these requirements of independent claim 18.

Further, claim 20 requires that the server TCP connections are persistent. As discussed above with respect to claim 8, the applied references fail to disclose or suggest this requirement, and the teachings of FIG. 8 of Aiken, cited by the Examiner as teaching this requirement, appear to in fact be directly contrary to the requirements of Applicant's claims. Again, Applicant respectfully requests the Examiner clarify or withdraw this rejection in any Advisory or other subsequent action.

Claims 22 and 23

Similar to requirements of independent claim 1 discussed above, independent claim 22 requires an intermediate device configured to monitor response parameters that are specific to individual ones of a plurality of server TCP connections from the intermediate device to the physical server device, wherein the intermediate networking device includes a plurality of agents, each agent assigned to a different one of the client TCP connections, and wherein one of the agents selects one of the plurality of server TCP connections from the intermediate device to the physical server device based on the monitoring. For the reasons discussed above with respect to claim 1, the applied references fail to disclose or suggest these requirements of independent claim 22.

Further, similar to claim 2 discussed above, claim 23 requires receiving HTTP responses from the single server device via a multiplexed transmission, demultiplexing the responses, and routing the responses to corresponding clients. Again, the applied references fail to disclose or suggest these limitations, and the figure of Aiken cited by the Examiner as teaching these limitations appears to be totally irrelevant to these limitations. Applicant respectfully requests the Examiner clarify or withdraw these rejections in any Advisory or other subsequent action.

Claims 24 and 25

Similar to independent claim 1, independent claim 24 requires a computer networking device being configured to monitor a plurality of persistent **server socket connections** from the computer networking device to a single physical server device to determine a response parameter that is specific to each of the **server socket connections, determine an optimal one of the server sockets** for each HTTP request based on the respective response parameters for each of the server sockets, and to send each HTTP request to the determined optimal server socket for the request via a multiplexed TCP transmission. For the reasons discussed above with respect to claim 1, the applied references fail to disclose or suggest these requirements of independent claim 24.

For at least these reasons, Aiken in view of Okanoya fails to establish a prima facie case for non-patentability of Applicant's claims 1-8, 10-18 and 20-25 under 35 U.S.C. § 103(a). Withdrawal of this rejection is requested.

CONCLUSION

All claims in this application are in condition for allowance. Applicant respectfully requests reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 50-1778. The Examiner is invited to telephone the below-signed attorney to discuss this application.

Date:

October 16, 2006

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